

CLAIMS

1. Biological water treatment process including the following steps:

- making the said water pass in at least one biological pond provided with a free or mixed biomass,  
5 pond inside which oxidising and reducing periods are alternated by starting and stopping aeration means, and

- performing at least one separation step on the mixed liquor in the biological pond so as to obtain sludge and treated water,

10 characterised in that it comprises preliminary steps consisting of:

- fixing a minimum allowable aeration time (T1min), a maximum allowable aeration time (T1max), a minimum allowable non-aeration time (T2min) and a maximum  
15 allowable non-aeration time (T2max) of the said mixed liquor;

- fixing a low set value (SB NO3) and at least one high set value (SH NO3) of the nitrate content in the treated water or the mixed liquor;

20 - fixing at least one high set value of the SH redox potential of the said mixed liquor;

and in that it comprises additional steps consisting of:

- continuously measuring the nitrate content in the  
25 treated water or the mixed liquor;

- continuously measuring the redox potential in the mixed liquor in the aeration pond;

- measuring the aeration time T1 and the non-aeration time T2 of the mixed liquor;

- not aerating the mixed liquor

either for as long as the measured nitrate content  
5 remains less than the said low set value (SB NO3) and the measured non-aeration time T2 is less than the minimum allowable non-aeration time T2min,

or when the measured nitrate content remains greater than the said low set value (SB NO3) and the measured  
10 non-aeration time T2 has not reached the maximum allowable non-aeration time T2max,

- aerating the mixed liquor

either for as long as the measured nitrate content remains greater than the said high set value (SH NO3) or  
15 when the value of the measured redox potential remains greater than the said high set value of the redox potential (SH redox) and the measured aeration time T1 is less than the minimum allowable aeration time T1min,

or when the measured nitrate content remains less  
20 than the said high set value (SH NO3) or when the value of the measured redox potential remains less than the said high set value of the redox potential (SH redox) and the measured aeration time T1 has not reached the maximum allowable aeration time T1max.

25 2. Process according to claim 1, characterised in that the process includes additional preliminary steps consisting of fixing a very high set value (STH NO3) of the nitrate content in the treated water or the mixed

liquor and a very high set value (STH Redox) of the redox potential of the mixed liquor,

and in that it consists of:

- not aerating the mixed liquor

5        either as long as the measured nitrate content remains less than the said low set value (SB NO3) and the measured non-aeration time T2 is less than the minimum allowable non-aeration time T2min,

10        or when the measured nitrate content remains greater than the said low set value (SB NO3) but the measured non-aeration time T2 has not reached the maximum allowable non-aeration time T2max,

- aerating the mixed liquor

15        either as long as the measured nitrate content remains greater than the said high set value (SH NO3) or the value of the measured redox potential remains greater than the said high redox potential set value (SH redox),

and the measured aeration time T1 is less than the minimum allowable aeration time T1min,

20        and the measured nitrate content has not reached the said very high set value (STH NO3) or the measured redox potential has not reached the said very high set value (STH Redox),

25        or when the measured nitrate content remains less than the said high set value (SH NO3) or the measured redox potential value remains less than the said high set value of the redox potential (SH redox) but the measured aeration time T1 has not reached the maximum allowable aeration time T1 max.

3. Process according to claim 2 characterised in that it includes additional steps consisting of:

- fixing at least one set value of the slope of the curve representing the variation of the redox potential in the mixed liquor with time;
- continuously calculating the said slope;
- continuously regulating the dispensed airflow during aeration to keep a redox slope constant and approximately equal to the said slope set value.

4. Process according to any one of claims 1 to 3 characterised in that the said separation step is a settlement step.

5. Process according to any one of claims 1 to 3 characterised in that the said separation step is a filtration step on at least one filtration membrane.

6. Process according to claim 5 characterised in that the said separation step consists of filtering the mixed liquor from the said biological pond on membranes, and is implemented in at least one external filtration loop provided with immersed or pressurised membranes.

7. Process according to claim 5 characterised in that the said separation step is performed using at least one membrane immersed in the said biological pond.

8. Process according to claims 3 and 7 comprising a step for aerating the said immersed membrane to prevent it from getting clogged or to unclog it, and in that it comprises steps for measuring the filtered water flow and for regulating the air flow dispensed for aeration of the said membrane as a function of the filtered water flow.